



Umeå Institute of Design
Umeå University

Cognitive Design

GreenLog Project

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Background

Bostaden AB is one of the leading actors in the project Green Citizens of Europe which has the goal to encourage sustainable living and traveling in the Umeå area.

During the beginning of the course Cognitive Design, Bostaden contacted us because they were looking to develop a new interface for their home appliance Echolog. The mentioned device is a interactive screen that measures your cold water, hot water and electricity consumption, aiming at lowering peoples costs and making them more environmentally aware. The screen is



most often placed right in the middle of the hallways leading into the apartments and is activated through a sensor placed in front of it. Bostaden had become aware that the residents had mixed opinions about the device however, so it was decided that we as a group went out and made some interviews regarding how the average user actually experienced the Echolog as a part of their homes. We first started of by handing out letters to the residents of Öbacka Strand asking for people to participate in interviews regarding how they perceived the device and also what types of new functions they would like to see implemented in the Echolog. During these interviews we got quite a broad range of varying responses, while some users perceived the device to be used as it was originally intended, something to motivate you to lower your consumption, other users could feel anything from irritation to indifference towards it. Some users rarely used the device to anything else other than looking at the weather forecast, but most were curious at what new functions that could be implemented in the device.

Some of the more critical users mentioned that the device way of displaying consumption always implied that you were doing something wrong, as your consumption (or over-consumption) was displayed by a set of red bars. This produced more of a stressful reaction for the users, which was quite opposite the intended “motivating” effect the system was supposed to have.

What the users all agreed that they would like to see in a future Echolog was among other things a laundry booking system, a way to activate your engine heater without getting out of your apartment and maybe even an emergency button.

Issue

After gathering this information the members of the group sat down and discussed what would be required of a new system. An improved system would have to be motivational to the users as opposed to the flash of red lights presented in the current system that signal consumption. The system itself had also to be easy to use and adapted to fit all users that could possibly reside in one of Bostadens apartments, which included elderly people and foreigners whose native language was some other than Swedish.

Brainstorming and concepts



All of these requirements were taken into consideration before the group started brainstorming about how different ideas could be implemented in the system. Eventually, it was decided that we would go ahead with one of three different concepts: The Cozy home concept, an environmental concept and finally a more economy-based approach.

The cozy home concept is about presenting the

Echolog as a part of the tenants everyday life by making it inviting to the user. The original design had a weather-function that already had become something that could be considered a part of the tenants everyday life.

The environmental approach was about motivating the users into using the Echolog by increasing their awareness of how their own consumption affected the environment.

Finally, the economy-based concept was focusing more on how to motivate the tenants to lower their consumption for economical gain by proving how much they could lower their water and electricity bills.



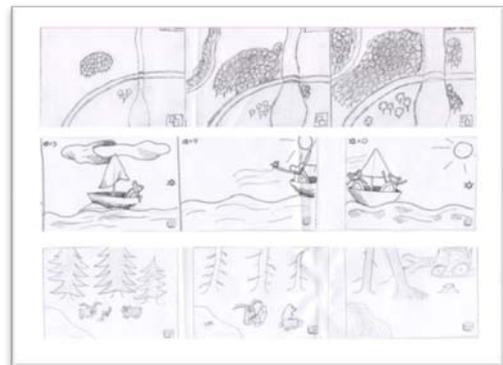
The first idea

Our first idea for a design centered around the cozy home concept, making the Echolog into a part of their daily routine. As our initial concept was developed as a system with plenty of functions and a implemented slide-motion for navigation throughout the system. Altogether the system was more esthetically pleasing than functional, the users were short of overwhelmed when greeted by a system with such complexity. Therefore we needed to rethink our idea to reduce the complexity of the system, scrapping the initial idea but keeping the parts we considered useful to our next design. The design features that would be



required of our new system were first of all those that focused on reducing the complexity of any given system. Having clear and visible information presented to the users without revealing too much at once, only showing what was essential to present to the user for the given moment. That said, no functions should be “hidden” under new levels of function

buttons, all interaction should be simple and easy accessible by the user. Also, the buttons presented should all be intuitive to the user as what functions they represented. To achieve this goal as easy as possible, we used symbols inspired by pictograms, a series of internationally recognized symbols that don't require text explanation. This partly because we wanted to avoid using a graphic language that was inspired by computer interfaces, because many of the future users of the new design of the Echolog were going to be elderly. As mentioned earlier, some of the users perceived the red colored meters stressful and even judgmental towards their own consumption. Therefore we kept in mind that the system should strive to be motivational as opposed to judgmental in the way it presented the users consumption or assumed over-consumption. Lastly, we wanted to archive this motivational effect by making the interaction with the system into something fun. The appealing part of lowering your consumption for the benefit of the environment would partly be that it was presented in a way that made it feel less abstract. Thus, we started of by organizing a number of different concepts that we would include as a sort of mini-game at the front page of the Echolog, before you entered the actual system. The concepts for the mini-game were of widely different ideas, but they all had in common that events happening in the game corresponded with the users daily consumption. For example, we had games that had a growing forest as something corresponding to the level of electricity consumed in the household. The more the electricity consumption was lowered, the more the forest grew. The different games varied in complexity, some games where more storyline-based and connected the events in the stories to the consumption as well.

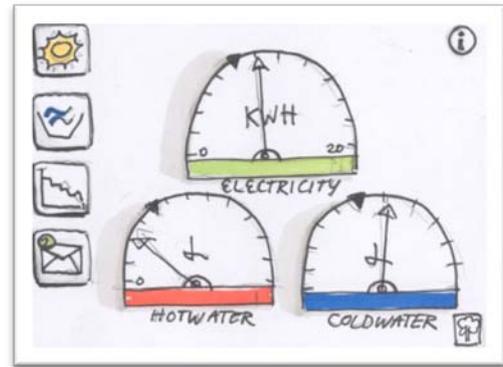


Paper prototyping and user testing

After developing our first idea further, we made paper prototypes of a number of different concepts for the mini-game and also one for the main interface. We tested our paper prototypes on a group of students from the master program of interactive design.



User testing proved that even if the earlier described story-line based approaches were considered fun, the users felt that they were disconnected from how they related to their own consumption. Therefore it was decided that we would develop one of the concepts that was simpler than the others, a representation of a growing forest corresponding with the users electricity consumption and a river growing branches of the user managed to lower their water-consumption. We also included a main menu where we had tried to develop a

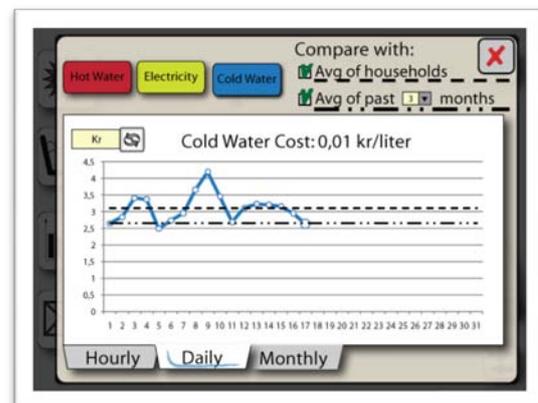


system after the concepts that we had decided upon earlier, making the system clear and intuitive. As for presenting the consumption, we used three meters that resembled speed-meters as a way of showing your daily consumption. Indicators were also placed on the meters that would show how today's consumption corresponded to the average daily consumption of the month.

User testing gave us feedback that allowed us to simplify this approach even more, also suggesting that we were to be more consequential in the way we used our color scheme. Therefore we decided to use more warm tones throughout our system and implement a more consequential color scheme.

Second idea and user testing

After this, our system was once again re-developed, yet again decreasing the number of levels throughout the system and implementing a more consequential outlook. We wanted to test our design one final time after that to make sure the new interface matched our previous requirements. The reactions from the real life residents we tested the design on were mostly positive. Altogether they felt like all the parts of the new system belonged together because of the matching color scheme and layout. The users also liked the new changes with the weather-system, the laundry booking and also our new implementation for how you were guiding yourself through the system. Also the meters in the main menu received some positive feedback, as they were considered an improvement as opposed to the current design. Some of the users however had some problems regarding the way the statistics were represented in the system. While the users didn't seem to have any problems with reading the graphs themselves or seeing what they represented, they had some greater difficulties understanding the part of the statistics that was supposed to simplify their use of comparative values. Therefore we decided that it was better if we simplified the comparative function itself, so that users would have no problems knowing what sort of comparative value that was represented on the graph. Besides this, some users complained



about the implementation of the mini-game at the front page of the Echolog, saying that they would probably just be annoyed if something other than the information they were looking for would be in the way when they started up the device. We took this criticism as a sign that there probably would be a varying interest for the mini-game for the different groups of users. Even though the game itself gives some sort of quick overview of how your consumption is doing, the meters of the main menu were considered more insinuating to all groups of users, even those who liked the mini-game feature. Therefore we decided to keep the mini-game but only allow it to trade places with the main menu, making the menu the first thing that greeted the user when activating the device. The function itself was reached through the same button that was implemented before. Lastly, some of the elderly who tried out our interface had some issues regarding the font size in some parts of the system. Therefore we tried to adapt the final design to have all text in the system enlarged and more visible than in the previous system.

Scenario

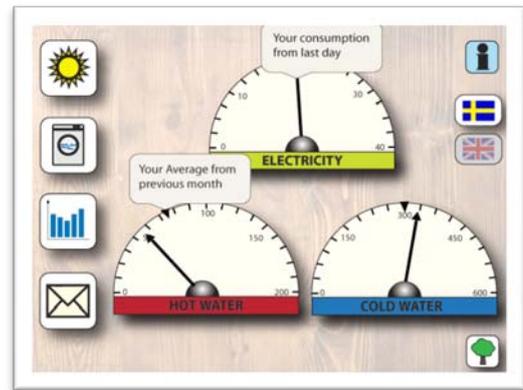
Märta is 77 years old. She lives at Öbacka and moved there from a large house where she had lived for 45 years. She hasn't got much experience of computers and new technology, but when she moved in to her new apartment she got information about a small screen placed in her hallway that measures her consumption of hot water, coldwater and electricity. After some weeks where the screen lit up every time she passes it, she tries to press it and notice that it shows her consumption of water and electricity. She understands what it tells her because of the meters represent on the screen that reminds her an analog meter that is familiar to her. She also understands that she can press the buttons locate on the left side of the screen and do so because of their button-like appearance. She understands that the sun shows her the weather and presses it because of the symbol that represents the weather. She gets a forecast of the week and exit the weather by pressing the x, which she understands is the way of closing a window. She is once again back in the main screen and notices a small information button. She tries to press it and get more information about what the meters are supposed to show her. She explores the entire system and after doing so, she is happy to conclude that she can understand it and use it without effort because of the symbols that is easy to understand and the font-size, which is large enough for her to read in spite of her impaired eyesight. The next day her 14 year old grandson comes to visit. He notices the system and sees a symbol that looks very interesting – a tree. He presses it and understands that it is a game. He explores the screen with the game and understands that it is a way of showing his grandmothers consumption in a game-like way. He thinks it is very amusing and tells his grandmother about that particular function she didn't pay attention to.

The final design



Our general idea with the final design was to use simplicity throughout the entire system. Our main menu of the final design had kept the previously mentioned speed-meters, only now with a more detailed design and with the warmer color-scheme. By showing the meters on the main page, we were aiming at presenting the daily consumption to the users in a way that was non-judgmental but still motivating and easy to read. The initial idea was to keep the main menu as clean and free from

unnecessary impressions that were unrelated to the direct functionality of the main menu. Also, the icons on the menu were all kept in the same style of visual language to form consistency throughout the entire system. If the users are looking for more information about what the indicators represent they can press the information button in the upper right corner of the screen. When pressing the button, users also get the option to toggle between languages by pressing one of the flag-buttons.



Electricity	
Your Consumption	Average of the Building
March	March
200 kWh	175 kWh
100 kr	87,5 kr
200 lightbulbs 40 W (The lightbulbs burn for 25 hours)	175 lightbulbs 40 W (The lightbulbs burn for 25 hours)

To get brief information of your consumption of either electricity, hot water or cold water, you can press the respective meter. Here you get a pop-up window where you get information about your consumption presented in a simple way. The values shown are first a comparison between your consumption and the average of the building for the previous month. The information you get is how much you have consumed represented in money, kWh/Liters and finally a real world

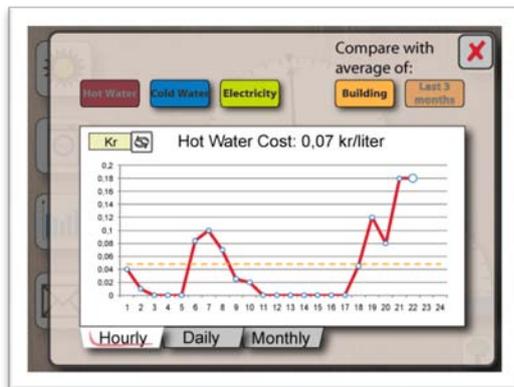
comparison for how much you've consumed in a more concrete value. For example, how many light bulbs you would be able to support with this consumption.

After closing the pop-up you get back to the main menu, where you can press the weather-icon on the top left side of the screen. Here you get a new pop-up window with a weather-forecast of the coming week. You get information of the temperature inside and outside your apartment, as well as the highest and lowest temperature of the forecast. By closing the window you get back to the main menu.

Sunday 13/3		In: 23°
Umeå	L: -11° H: -3°	Out: -5°
Monday	L: -11 H: -3	
Tuesday	L: -7 H: -1	
Wednesday	L: -6 H: -1	
Thursday	L: -6 H: -3	
Friday	L: -5 H: 0	
Saturday	L: -3 H: -1	



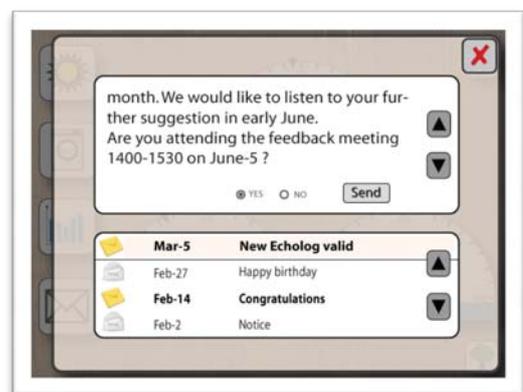
When pressing the icon resembling a washing machine, you get to this pop-up window. The areas that are crossed-over and filled with a room-number represent booked laundry times by corresponding apartment owners. The rest of the empty times on the schedule is where you can book your laundry time by pressing an empty box. When you press the desired empty slot in the schedule, a green arrow appears to indicate that your booking has come through. After booking your desired laundry time, you also get feedback from the system in form of a text that explains that you've booked a certain time. Should you desire to unbook your laundry time, you simply press the slot with the green arrow as before to make it go away. To go back to the main menu, you simply close the laundry window the same way as before.



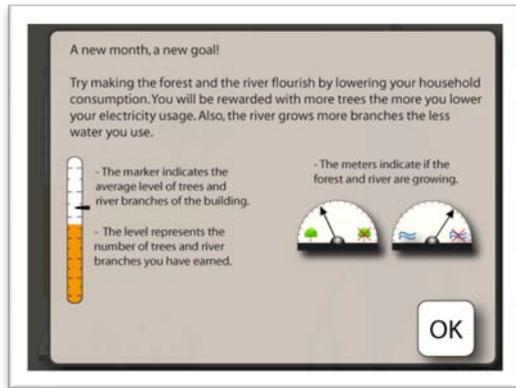
The third button down from the left side of the screen is the one representing statistics. When pressing the button users are greeted by a screen that shows their hourly consumption of hot water during the day represented in money. To see your consumption in hot water or cold water instead, one simply presses the corresponding button in the upper left corner. By looking at the dotted line the user is able to compare with the average daily consumption of the household for the last three months. The user

is also able to press the other orange button to compare with the average of the building instead. If the user would like to see any other unit representing their consumption (liters for water, kWh for electricity) one can toggle the information on the y-axis by pressing the button in the top-left corner of the graph. Also, the users are able to switch the information displayed on the x-axis by pressing one of the buttons under the graph. There the user is able to toggle between the timeframe if the resident wishes to look at their own consumption during a broader period of time. If one wants to go back to the main menu, the pop-up closes in the same way as the other windows.

The last button to the right represents an envelope, and by clicking this button the users are sent to the mail function where the users can read messages sent by Bostaden. If the button has a highlighted circle with a number on it in the right corner, it means that the user has as many unread messages as the number indicates. The mail pop-up window presents all unread messages in a highlighted, colored form and the user is also able to distinguish them by noticing how the read messages have a

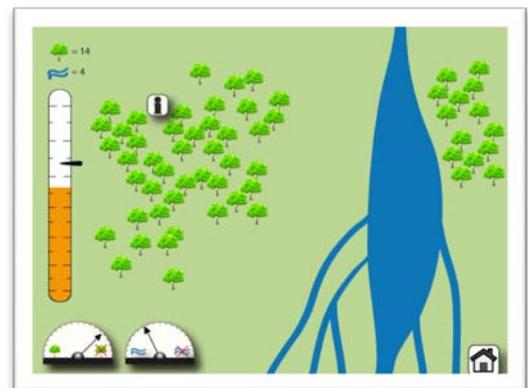


symbol of an opened envelope next to them. When reading the message, the user is able to toggle up and down by pressing the buttons to the side of the screen, also of the message requires some kind of response, the user can select an option and then press the “Send”-button. By doing this, the user gets feedback in form of a text that tells you that: “You have replied”, also the text in the message is grayed out.

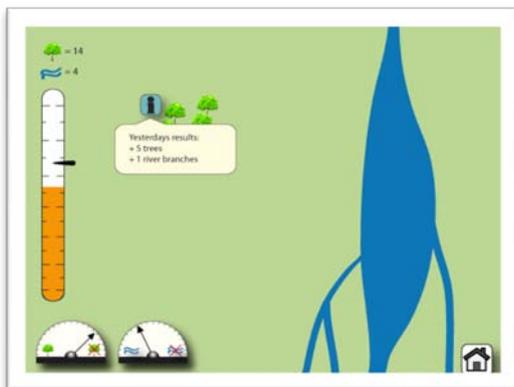


Finally, when pressing the button resembling a tree in the lower-right part of the screen of the main menu, one reaches the in-built game of the Green Log. A screen explaining the games objective is the first thing that greets any new user and also a screen that reappears every new month. The screen explains the games different functions and how you improve your results of the game. When pressing the “OK” button, the users reach a screen

representing a growing forest and a flowing river. The objective of the game is to grow as many trees and water branches as possible each month. The meters to the bottom of the left screen show how close you are to receiving a new tree or water branch, and the meter above them represents your overall progress in the game, and the indicator shows the average level of progress in the game of your building. When pressing the information button, information is presented regarding how



many new trees or river branches you have been rewarded with. The number of trees that the system grows corresponds with how much you lower your electricity consumption and the number of river branches you grow corresponds with how much you’ve lowered your water consumption. This was thought to be a way to motivate the users into lowering their consumption in a way that was fun, non-stressful and rewarding.



Conclusion

What we have done is to design an interface that everyone can use despite knowledge and age. The interface is very clear and you have easy access every function in the system and you always remain in the same position when you are in a function – in a pop-up window right above the main menu. This gives you a feeling of being in control of your usage, which is very important especially for elderly who might not be experienced users. The system isn’t judging you anymore and instead motivate you to use the system because of the easy

information and the game which provides you with different visual feedback of your consumption instead of just feedback in the colors red or green. The system is throughout design in the same manner with pictograms as symbols which is easy to recognize for everyone. The color scheme follows the same principle except the game which represent nature and therefore is represented in blue and green instead of warm brown and beige. We have used these colors to provide the user with a warm and homelike feeling with the wooden background in the main page to intensify this point. Because of this we have achieved the goal to make an interface that is easy to use, motivates you and belong in your home.